embodiment of the present invention. The porosity membrane **710** can be used to implement tactile regions for controlling surface textures. Device **700** includes an insulated layer **706** and a haptic layer **712**. While the top surface of insulated layer **706** is configured to receive inputs from a user, the bottom surface of insulated layer **706** is placed adjacent to the top surface of haptic layer **712**. The bottom surface of haptic layer **712** is, in one embodiment, placed adjacent to a display (not shown in FIG. **7**), wherein haptic layer **712** and insulated layer **706** may be substantially transparent thereby objects or images displayed in the display can be seen through haptic layer **712** and insulated layer **706**. It should be noted that display is not a necessary component in order for the interface device to function.

[0088] Haptic layer **712**, in one embodiment, includes a grid of haptic cells **702**, inlet valves **703**, and outlet valves **704**. Haptic cells **702**, in one embodiment, are pockets capable of containing fluid. Haptic layer **712** is similar to haptic layer **612** as shown in FIG. **6**(*a*) except that haptic layer **712** employs porosity membranes. While each inlet valve **703** is controlled by control signal(s) transmitted by wire **713**, each outlet valve **704** is controlled by electrical signals transmitted over a wire **714**. Every inlet valve **703** or outlet valve **704** employs at least one porosity membrane **710**. Porosity membranes **710** are coupled (or faced) to a liquid reservoir wherein each membrane **710** is configured to control how much liquid should enter and/or pass through membrane **710**. An advantage of using porosity membranes is to maintain the deformation of insulated layer **706** with minimal or no energy consumption. As such, a grid of haptic cells using variable porosity membrane **710** may be used to control the surface texture of touch-sensitive surface of the interface device.

[0089] FIG. **8** is a side view of an interface device **800** having an array of haptic cells **802** using various resonant devices in accordance with one embodiment of the present invention. The array of haptic cells **802** can be used to implement tactile regions for controlling surface textures. Device **800** includes an insulated layer **806** and a haptic layer **812**. While the top surface of insulated layer **806** is configured to receive an input from a user, the bottom surface of insulated layer **806** is placed adjacent to the top surface of haptic layer **812**. The bottom surface of haptic layer **812** is, in one embodiment, placed adjacent to a display (not shown in FIG. **8**), wherein haptic layer **812** and insulated layer **806** may be substantially transparent thereby objects or images displayed in the display can be seen through haptic layer **812** and insulated layer **806**. It should be noted that insulated layer **806** may be flexible whereby it is capable of providing desirable relief information on its surface.

[0090] Haptic layer **812**, in one embodiment, includes a grid of haptic cells **802**, wherein each cell **802** further includes a permanent magnet **804**, an electro magnet **810**, and two springs **808**. Haptic layer **812** is similar to haptic layer **612** shown in FIG. **6**(*a*) except that haptic layer **812** employs resonant devices while haptic layer **612** uses MEMS pumps. Haptic cell **802**, in one embodiment, uses a resonant mechanical retractable device to generate haptic effects. The resonant mechanical retractable device vibrates in response to a unique frequency, which could be generated by a side mounted resonant stimulator **816** or a rear mounted resonant stimulator **814**. A resonant grid, in one embodiment, is used to form a haptic layer **812**. Each cell **802** is constructed using resonant mechanical elements such as linear resonant actuator ("LRA") or MEMS springs. Each cell **802**, however, is configured to have a slightly different resonant frequency and a high Q (high amplification at resonance and a narrow resonant frequency band). As such, each cell **802** can be stimulated using mechanical pressure waves originating at the edges of the sheet. The haptic effects can also be generated by a piezoelectric or other high bandwidth actuator.

[0091] Cell **802**, in another embodiment, includes one spring **808**. In yet another embodiment, cell **802** includes more than two springs **808**. Each spring **808** is configured to respond to a specific range of frequencies thereby each spring **808** can produce a unique haptic sensation. As such, a grid of haptic cells using various resonant devices may be used to control the surface texture of touch-sensitive surface of the interface device. For example, if the displacement of haptic mechanism is sufficiently high such as 200 micrometers or greater, the movement (or tactile vibration) with low frequencies such as 50 Hz or less should sufficiently create desirable relief information.

[0092] The exemplary embodiment(s) of the present invention includes various processing steps which will be described below. The steps of the embodiments may be embodied in machine or computer executable instructions. The instructions can be used to cause a general purpose or special purpose system or controller, which is programmed with the instructions, to perform the steps of the embodiment (s) of the present invention.

[0093] FIG. **9** is a flowchart **900** illustrating a process of generating haptic feedback from plasma generator in accordance with one embodiment of the present invention. At block **902**, a process of providing haptic feedback generates plasma, which is facilitated by a substrate. The substrate, for instance, is coupled to a power source. The process is further capable of providing ionized gas with free electrons.

[0094] At block **904**, the process places a touch surface over the substrate with a separation gap between the touch surface and the substrate. In one embodiment, upon depositing a touch-sensitive flexible surface capable of sensing a depressing by a user's finger, the process divides the separation gap into multiple pockets, which are capable of housing plasma. Alternatively, after depositing a touch-sensitive surface capable of sensing a finger capacitance from a touch by a user's finger, the process divides the separation gap into multiple pockets, which are capable of housing plasma.

[0095] At block **906**, the process aggregates plasma in the separation gap. In one aspect, the process fills one or more pockets in the separation gap with ionized gas having free electrons.

[0096] At block **908**, the process detects a contact over a first surface of the touch surface. In one embodiment, the process is capable of sensing a depression of a finger tip on a deformable touch surface. Alternatively, the process is capable of sensing a change of capacitance caused by a touch of a finger tip on the touch surface.

[0097] At block **910**, the process transfers energy from the substrate through plasma to the touch surface in response to the contact. Upon coupling a substrate with a power source and coupling a touch sensitive device to the touch surface for detecting the contact, the process provides tactile feedback to acknowledge the contact at the first surface in response to energy transfer from plasmas gas via a second surface of the touch surface to the first surface. In one example, the process is capable of releasing static discharge built up by the plasma.